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ABSTRACT

Beginning in Fall, 1974, the Federal Higher Education Information Survey (HEGIS) Inventory of College and University Physical Facilities, submitted by each postsecondary educational institution, included a requirement to report on the condition of the facilities. This requirement emphasized the importance of developing guidelines for institutions in determining the need for renovation and modernization. This manual sets forth a method for systematically inspecting building components and for assigning points to them based on comparison with components in a new or satisfactorily remodeled facility. The total point value of all components can be translated into a HEGIS facility condition category. The aggregated results for all facilities at an institution will meet the requirements of the HEGIS Report while the individual building evaluations will provide a basis for determining priorities for renovation among buildings. (Author)

BUILDING QUALITY EVALUATION PROCEDURALS MANUAL

South Carolina
Commission on Higher Education
COLUMBIA
SEPTEMBER, 1976

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FOREWORD

Beginning in Fall, 1974, the Federal Higher Education Information Survey (HEGIS) Inventory of College and University Physical Facilities, submitted by each postsecondary educational institution, included a requirement to report on the condition of the facilities. This requirement emphasized the importance of developing guidelines for institutions in determining the need for renovation and modernization.

This manual sets forth a method for systematically inspecting building components and for assigning points to them based on comparison with components in a new or satisfactorily remodeled facility. The total point value of all components can be translated into a HEGIS facility condition category. The aggregated results for all facilities at an institution will meet the requirements of the HEGIS Report while the individual building evaluations will provide a basis for determining priorities for renovation among buildings.

Many individuals contributed to the development of this manual. A Technical Review Panel significantly influenced its direction and scope. Members of the Panel were Michael Abbott, Coordinator, Division of Planning and Evaluation, State Board for Technical and Comprehensive Education; William Baron, Associate Professor of Civil Engineering, Clemson University; Robert E. Clark, Physical Plant Director, Medical University of South Carolina; Carl H. Clawson, Director of Physical Planning and Construction, Furman University; and J. Hubert Noland, Professor of Electrical Engineering, University of South Carolina. Robert T. Barham, Business Manager and Treasurer, Columbia College; Harold Brunton, Vice President for Operations, University of South Carolina; Don H. Morris, Superintendent of Purchasing and General Plant Operations, Midlands Technical College; and other members of the staffs of these institutions participated in field tests of the proposed procedures. Lyles, Bissett, Carlisle and Wolff, with Robert E. Woodward as Project Director, provided extensive consultant services. The contributions of all are appreciated. Acknowledgment is also made of the contributions of James R. Michael and James L. Solomon, Jr., members of the Commission staff responsible for this project.

Howard R. Boozer

September, 1976

BUILDING QUALITY EVALUATION
PROCEDURES MANUAL

CONTENTS

I. PURPOSE AND SCOPE

Objective

The primary objective of the procedures described herein is to assist postsecondary educational institutions in meeting a federal requirement to report condition of space in physical facilities. This requirement, a part of the Federal Higher Education General Information (HEGIS) Inventory of College and University Physical Facilities, requires that all space on campus be categorized as to condition as follows:

1. Satisfactory: Suitable for continued use with normal maintenance.

2. Remodeling-A: Requires restoration to present acceptable standards without major room-use changes, alterations or modernization. The estimated cost is not greater than 25 percent of the estimated replacement cost of the building.

3. Remodeling-B: Requires major updating and/or modernization of the building. The approximate cost is greater than 25 percent but not more than 50 percent of the estimated replacement cost of the building.

4. Remodeling-C: Requires major remodeling of the building. The approximate cost is greater than 50 percent of the replacement cost of the building.

5. Demolition: Should be demolished or abandoned because the building is unsafe or structurally unsound, irrespective of the need for the space or the availability of funds for a replacement.

6. Termination: Planned termination or relinquishment of occupancy of the building for reasons other than unsafeness or structural unsoundness such as abandoning temporary units, vacating leased space, or disposing as surplus to needs.

The procedures described herein provide for the evaluation of individual facilities, the aggregated results of which will meet the requirements of the HEGIS report. In addition, the reports on individual facilities can provide the basis for the institution to determine priorities for renovation among facilities.

General Procedures

The physical condition of a facility is estimated by inspection of the following building components and systems and assignment of points based on comparison with corresponding components and systems in a new or satisfactory high quality facility:

1.	PRIMARY STRUCTURE	Subtotal of points------57
	Foundation	(17)
	Walls	(15)
	Floors	(17)
	Roof	(8)
2.	SECONDARY STRUCTURE	Subtotal of points------12
	Ceilings	(3)
	Interior Walls and Partitions	(5)
	Windows and Doors	(4)
3.	BUILDING SERVICE	Subtotal of points------31
	Heating	(4)
	Cooling	(11)
	Plumbing	(6)
	Electrical	(10)
	Total points for the facility----------	100

The evaluator assigns a point value to the total facility based on his best judgment of the condition of each of the subsystems with 100 indicating no deficiencies and 0 indicating that replacement is required. The following is suggested as a correlation between the total score and the HEGIS facility condition categories:

Total Points	HEGIS Condition
90-100	Satisfactory
69-31	Remodeling-A
41-68	Remodeling-B
Under 41	Remodeling-C or Demolition

As a part of the procedure each facility is evaluated for safety and access by the handicapped. If the evaluation indicates need for renovation to provide essential safety or access, the evaluator may adjust the HEGIS category to reflect significant additional cost.

Each facility is evaluated for function based upon its current use. If a facility cannot meet any space requirements of the institution it is classified for Demolition or Termination regardless of the physical condition evaluation.

Each facility scheduled for Demolition or Termination is then evaluated for historical, traditional or other intangible considerations which would justify retention. If a facility must be retained regardless of poor physical condition, it will be classified at least as high as Remodel-C.

Limitations

The evaluation assumes the facility will continue to perform the function(s) for which it was constructed or previously remodeled. If

function(s) are to change significantly, a functional evaluation is required based on the proposed functional use.

Most of the evaluation is subjective, based on the best judgment of the individual(s) conducting the survey. To obtain results as uniform as possible, the same individual(s) should evaluate all facilities included in the HEGIS report.

Although the evaluation is designed to be conducted by staff members who may not be trained architects or engineers, skilled assistance should be provided when possible. Qualified staff and faculty members not directly concerned with the institution's management of facilities are a possible source of assistance. Two or more institutions may also cooperate to form an evaluation team to serve several institutions.

While the evaluation can provide an approximate guide to estimating the cost of renovations, it is best used in determining priorities for renovations. It is recommended that qualified professional assistance be employed in estimating costs.

II. PROCEDURES

Recording Observations

These procedures provide for a systematic inspection of the entire building by a "walk through" type of inspection. During the inspection the evaluator will make judgments on the condition of certain building characteristics based on the condition of the total building. The following building characteristics will be considered:

1. Primary structure
2. Secondary structure
3. Building systems
4. Safety, and access by handicapped
5. Function
6. Intangible considerations

A form is provided for recording observations for each of these and for summarizing the results (see Appendix A). The physical condition of the primary and secondary structures and the building systems are evaluated by assigning points with 100 indicating no deficiencies. The total points assigned provide a preliminary assessment of the physical condition of the facility.

The adaptability and suitability of the facility to meet a need of the institution, intangible considerations, and safety for all and access for the handicapped are considered by answering Yes or No to a series of pertinent questions. As a result of these evaluations, the HEGIS evaluation may be adjusted as follows:

1. If there are safety or access problems, consideration should be given to modifying the HEGIS category to reflect significant added expense for correcting these problems.

2. If the facility cannot meet any space requirements of the institution it should be classified for Demolition or Termination regardless of the physical condition evaluation.

3. Finally, if there are intangible considerations which dictate retention regardless of poor physical condition, the facility should be classified at least as high as Remodeling-C.

The end result of the inspection is a determination of the appropriate HEGIS category.

Special Evaluations

For each item requiring an evaluation, the forms provide a space to check "Special Evaluation." A special evaluation is indicated when the evaluator believes an unsatisfactory condition may exist for which he does not have the time or expertise to evaluate. The condition requiring a special evaluation should be described briefly on the form. If the HEGIS report must be completed before the special evaluation is made, the institution must make a judgment in arriving at a HEGIS category. However, special evaluations should indicate conditions requiring attention for further evaluation as soon as feasible.

Inspection Criteria

This section provides guidance or conditions or considerations which are considered significant in the evaluation process. Key phrases from the following descriptions (e.g., Cracked foundation? Broken or cracked walls?) are included as appropriate on each form to assist the evaluator.

A. Primary structure

A building should be safe and structurally sound, free of wall and foundation cracks, warps, settlement or any visual sign of deterioration. Small "hairline" cracks in concrete or masonry are normal and should not be of significant concern. Cracks of 1/4 inch or more or separation in the vertical or horizontal plane of a foundation, wall or floor are significant.

The basement area should not show evidence of subsurface drainage into the building through the walls or floors. The floor system structure should have adequate strength and not present any evidence of warping, sagging or movement.

The roof should be free of leaks and cracks in its surface material and provide proper drainage without excessive pooling of water. Indications of leakage may be seen on internal ceilings and walls in the form of discoloration and/or spalling.

B. Secondary structure

The interior should have safe and modern appointments. The ceiling should be of a material which provides adequate acoustic control, such as sprayed plaster or perforated acoustical tile or panels, and should be properly supported without warps or sagging, major cracks, spalling or missing plaster.

Walls and partitions should be stable, attractive and suitably painted, paneled or covered with acceptable materials.

The doors and windows should be aluminum or steel framed, well sealed and with appropriate operating hardware. Outside doors should be equipped with fire exit crash bolts or crash bars (panic hardware) and should open outward. Wooden doors and windows on the exterior are considered obsolete.

Floors should be covered with a suitable low maintenance material such as resilient tile, terrazzo, or carpet. Buildings of more than one story should have a minimum of two stairways and two exits and an elevator. (See the following sections on Safety and Handicapped.) All interior surfaces should be easily maintained.

C. Building systems

The heating and cooling systems should maintain a comfortable internal environment and have adequate multi-zone control systems for effective zone control as required. Single zone systems are generally inadequate. The systems should be modern. Heating is considered obsolete if by space heaters or steam radiators; air conditioning is considered obsolete if by window units alone. Control systems should have outside air temperature input controls. Heating and cooling systems should not require excessive maintenance.

Lighting levels in office and instructional areas should be adequate as measured by acceptable standards (see Appendix B) and the fixtures and controls should be adequate in number and location. Lighting levels in halls and other areas may be lower than for instructional or office areas. Energy conservation practices may have resulted in lower lighting levels than are listed in the standards shown in Appendix B, and evaluation should be made at the normal level when normal levels are reduced to conserve energy.

Instructional and office areas should have an adequate number of conveniently placed wall electrical outlets, generally a minimum of one per wall or every 15 feet, to service instructional and office equipment.

Electrical systems should be adequately equipped with modern switchgear. There must be adequate circuits, protected by circuit breakers, to handle the building power requirements. Fusing protection is considered obsolete except for proper interrupt capacity. Vacant circuit connections may be an indication of reserve power capacity.

The plumbing system of the building should be sized to provide an adequate supply of water and to remove waste water. The gas system, if present, should be adequate for the demands of the building. Utility systems should have appropriate shut off valves near the entry supply lines. Sewage lines should have properly placed cleanout plugs. There should be no cross connections between the fresh water and the wastewater systems which would allow siphonage between the two.

The toilet facilities should have an adequate number of fixtures by acceptable standards according to the building's normal occupancy (see Appendix B). All fixtures should be of modern design and properly installed without leakage. Water supply lines should have cutoff valves near the fixture.

D. Safety

Facilities should be inspected by the State Fire Marshal or his designated representative who will provide specific guidance on minimum fire safety standards.

The following are characteristic requirements for public buildings:

1. Fire Alarm Systems: Systems should be provided with separate independent circuitry and properly placed alarm or call boxes at or near the principal entry of a building and on each floor.

2. Fire Escape Systems: All buildings should have at least two means of egress or exits for each floor of a building. Such means should include marked and lighted building or floor exits located not more than 100 feet from any classroom or other closed area, and may include outside fire escape systems or internal stairways. If outside escape systems are used, the nearest windows should present no obstruction, bars or hazards for effective use. Internal stairways should be of adequate size and lead directly to the outside entry of the building. Outside entries should be equipped with panic door hardware to open outward.

3. Fire Extinguishers: Proper types of fire extinguishers should be provided on each building floor so that not more than 100 feet of travel is necessary to secure the use of an extinguisher. In laboratories and shops extinguishers should be within 50 feet.

4. Other Systems: For most public facilities sprinkler systems or hose and standpipe systems should be provided as required by building usage and design. Generally, buildings of two stories or more or which exceed 50 feet in height should be provided with standpipe and hose facilities on each floor, either 1½" or 2½" hose systems.

Public buildings should be inspected by the State Department of Labor to ensure compliance with the Occupational Safety and Health Act (OSHA).

E. Access by Handicapped

South Carolina Act No. 1191, 1974, established the South Carolina Board for Barrier Free Design and directed it to establish minimum standards and specifications necessary to eliminate architectural barriers to entry and use of buildings and their facilities by the aged, disabled and physically handicapped. In general the minimum standards will require ramps where necessary to overcome steps; minimum width of three feet on doors; hand rails on stairs; toilet grab bars; an elevator for buildings of more than one floor; and internal arrangements that provide for ease of circulation for persons in wheel chairs.

Act No. 1191 provides that if an institution determines that full compliance with a standard is impractical or unreasonable, it may apply to the Board for a waiver. The Board may waive or modify a standard if:

(1) The purpose of the Act can be fulfilled by an acceptable alternative to the particular standard; or

(2) The incremental construction cost to conform to the standard exceeds seven percent of the total renovation costs.

Examples of possible alternatives include moving classes in which handicapped are enrolled to accessible areas, and requiring staff and faculty members to schedule meetings with handicapped in accessible areas.

F. Functional Evaluation

The purpose of this evaluation is to determine if the facility can meet a space requirement of the institution. The building's internal features should not present structural or design barriers to flexible uses of space, such as rigid partitions (load bearing), stationary furniture or equipment, or space so designed and defined by walls or other barriers that the space cannot economically be used for other purposes. Inability to use a building's space in a flexible mode is a negative feature of a building.

Building areas should not have noise, odor or acoustics that provide an undesirable working environment for the function for which the area is utilized. Certain areas such as heavy laboratories may well have one or more of these conditions present which are completely in keeping with the area's intended usage.

Buildings should be so placed that their orientation and location do not present problems for other structures or problems for effective space use within the building. Aesthetic or visual appearance of the building both internally and externally should not detract from effective usage.

Insufficient utility services to an area may be a factor in determining the suitability of space. Limitations on personnel access and circulation may in turn limit use of the facility.

Site conditions may also detract from effective use of buildings. Examples are improper drainage, deteriorating entry walkways, and general site relationships.

A building's assignable (usable) space in relation to its gross space indicates the design efficiency of the building. The assignable area is computed from the gross area by subtracting all areas used for circulation, custodial, mechanical and structural functions. An assignable-to-gross ratio of 60% or less suggests a significant amount of wasted space.

G. Intangible considerations

A facility may have historical, traditional or other considerations that are difficult to quantify but which exert a strong influence over a decision to demolish. Any facility over 50 years of age may be considered for listing on the National Register of Historical Places. Any facility listed on the Register may require special clearance even to renovate.

There may be legal requirements (e.g., conditions of a federal grant or a bequest) which must be considered. The space provided by the facility may be unique and not easily replaced. It is conceivable that financial investment in the facility has been so great that continued utilization is almost a necessity.

All these and perhaps other intangible factors must be considered prior to demolishing or terminating the use of a facility.

APPENDIX A

REPORTING
FORMS

BUILDING QUALITY EVALUATION 100

INST. NO. [ ]
BULD. NO.

Building Quality Evaluation Summary

INSTITUTION: _____

BUILDING: _____

TECHNICAL EVALUATION - (Forms 101, 102, 103 and 104) TOTAL POINTS

1. Primary Structure.....(Form 101)..... _____
2. Secondary Structure .....(Form 102)..... _____
3. Building Systems.....(Form 103)..... _____

TOTAL POINTS FOR THE BUILDING _____

4. Are critical safety and access requirements apparently met? Yes____ No ____ If no, consider adjusting final rating to reflect costs of modification to meet requirements (Form 104).

MANAGEMENT EVALUATION - (Forms 105 and 106)

5. Can the building meet any functional needs of the instituion? Yes ____ No ____ If no, classify as Demolish or Terminate (Form 105)
6. Are there intangible considerations that support retention of the building regardless of condition? Yes ____ No ____ If yes, class so as to retain (Form 106).
7. Rating of facility assigned:

(90-100)	Satisfactory _____
(69-89)	Remodel A_____
(41-68)	Remodel B_____
(0-40)	Remodel C_____
	or
	Demolish _____
	Terminate_____

8. List special evaluations that should be made (use reverse side if necessary) :

Evaluator (Technical)_____ Date_____

Evaluator (Management) _____ Date_____

FORM 100

BUILDING QUALITY EVALUATION 101

INST. NO.
BULD. NO.

1.0 Primary Structure

BUILDING: _____

	POINTS DEDUCTED	SPEC EVAL	ADJ. PTS.
1.1 Foundation - Max. Points 17	Adjusted Points.		
a. Cracked foundation?.			
b. Settlement apparent?			
c. Poor drainage apparent?.			
d. Slab tilting apparent?			
1.2 Wall System - Max. Points 15	Adjusted Points.		
a. Broken or cracked walls?			
b. Out of plumb or warped walls?.			
c. Rotting or deteriorating wall?			
1.3 Floor System - Max. Points 17	Adjusted Points.		
a. Deteriorating or rotting floor?.			
b. Inadequate or unsafe floor covering?			
c. Floor movement excessive?.			
d. Excessive maintenance?			
1.4 Roof System - Max. Points 8	Adjusted Points.		
a. Deteriorating roof structure?			
Excessive roof patching and sealing?			
b. Structural problems evident?			
Roof sagging?			
c. Inadequate draining of roof?.			
Water puddles apparent?.			
d. Apparent leakage?.			
Water marks on ceilings?			
e. Excessive maintenance?			

TOTAL CATEGORY POINTS 57 TOTAL ADJUSTED POINTS . . . . .

EVALUATOR: _____ DATE: _____

BUILDING QUALITY EVALUATION 102

INST. NO. _____
BULD. NO. _____

2.0 Secondary Structure

BUILDING: _____

	POINTS DEDUCTED	SPEC. EVAL.	ADJ. PTS.
2.1 Ceiling System - Max. Points 3 — Adjusted Points			
a. Deteriorating ceiling?			
b. Inadequate height or clearance?			
c. Cracking - sagging of ceiling?			
d. Inadequate acoustical control?			
e. Excessive maintenance?			
2.2 Interior Walls/Partitions Max. Points 5 — Adjusted Points			
a. Inadequate acoustical qualities?			
b. Lack strength and stability?			
c. Lack adaptability of partitions?			
d. Deteriorating walls or partitions?			
e. Excessive maintenance?			
2.3 Windows/Doors - Max. Points 4 — Adjusted Points			
a. Inadequate functioning?			
b. Inadequate hardware?			
c. Deterioration of doors or windows?			
d. Wooden exterior doors? If yes, deduct 2 points			
e. Wooden exterior windows? If yes, deduct 2 points			
f. Excessive maintenance?			

TOTAL CATEGORY POINTS - 12 TOTAL ADJUSTED POINTS _____

EVALUATOR _____ DATE: _____

BUILDING QUALITY EVALUATION 103

INST. NO. | | | | | | |
BULD. NO. | | | | |

3.0 Building Systems

BUILDING _____

	POINTS DEDUCTED	SPEC EVAL	ADJ. PTS
3.1 Heating System: - Max. Points 4 Adjusted Points.			
a. Inadequate heating capacity?.			
b. Unsatisfactory ventilation/circulation?			
c. Inadequate temperature and distribution control?.			
d. Steam radiator only? If yes, deduct 3 points			
e. Excessive systems maintainance?			
3.2 Cooling System: - Max. Points 11 Adjusted Points.			
a. No cooling system present: If no cooling system or window units only, deduct 11 points			
b. Window units only?			
c. Improper ventilation?			
d. Inadequate temperature and distribution control?.			
e. Excessive systems maintenance?.			
3.3 Plumbing System: - Max. Points 6 Adjusted Points.			
a. Inadequate water lines capacity?.			
b. Inadequate gas lines capacity?			
c. Inadequate shut off valves?			
d. Inadequate clean-out system?.			
e. Inadequate number of fixtures for men? See standards			
f. Inadequate number of fixtures for women? See standards. . . .			
3.4 Electrical and Lighting System: Max. Points 10 Adjusted Points.			
a. Inadequate wiring system/circuits?			
b. Inadequate main electrical switchgear?.			
c. Inadequate capacity to handle connected load?			
d. Fragmented electrical system?			
e. Inadequate number of outlets?.			
f. Poor lighting environment--class & office?.			
g. Poor exit and hall lighting?			
h. Inadequate and obsolete fixtures?			
i. Inadequate lighting control?			

TOTAL CATEGORY POINTS - 31 TOTAL ADJUSTED POINTS. . .

EVALUATOR: _____ DATE: _____

BUILDING QUALITY EVALUATION-104

INST. NO. | | | | | | | |
BLDG. NO. | | | | |

4.0 Safety and Handicapped Access

BUILDING: _____

	YES	NO	SPEC. EVAL.
4.1 SAFETY -			
a. Fire extinguishers and hoses adequate?.			
b. Acceptable fire alarm system present?			
c. Independent circuitry for fire alarm?			
d. Exits and stairways adequate and marked?.			
e. Personnel circulation adequate?			
f. Sprinkler system present?			
4.2 HANDICAPPED -			
a. Elevator present, if required? (Building more than one floor?).			
b. Toilet area grab bars?.			
c. Entry ramp present, if required			
d. Width of doors at least 36 inches?			
e. Circulation in wheel chair possible?.			

EVALUATOR: _____ DATE: _____

BUILDING QUALITY EVALUATION 105

INST. NO. | | | | | | | |
BLDG. NO. | | | | :

5.0 Functional Evaluation

BUILDING: _____

	YES	NO	SPEC. EVAL.
5.1 ADAPTABILITY -			
a. Flexible partitions?			
b. Flexible design?			
c. Equipment easily moved?			
d. Other considerations?			
5.2 SUITABILITY -			
a. Desirable working environment? (Noise, odor, acoustics)			
b. Good building orientation?			
c. Aesthetic factors favorable?			
d. Good personnel access and circulation?			
e. Siting without conflicts or limitation?			
f. Acceptable assignable-to-gross ratio?			
g. Other considerations?			
5.3 If remodeled at no more than 50% of the cost of a new facility, can this building meet a need of the institution?			

EVALUATOR: _____ DATE: _____

FORM 105

BUILDING QUALITY EVALUATION 106

INST. NO. | | | | | | |
BLDG. NO. | | | | |

6.0 Intangible Evaluation

BUILDING: _____

		YES	NO	SPEC. EVAL.
6.1	HISTORICAL -			
	a. Significant historical structure?			
	b. Significant tradition?.			
6.2	OTHER -			
	a. Legal considerations?			
	b. Heavy financial investment, particularly in recent years?			
6.3	Do any of the above considerations indicate that the facility should be retained regardless of physical conditions?.			

EVALUATOR: _____ DATE: _____

FORM 106

APPENDIX B

EVALUATION
STANDARDS

Evaluation Standards

A. SURFACE REFLECTANCE RECOMMENDATIONS: (Form 103)

Ceilings	70 - 90%
Wall areas	40 - 60%
Blackboard areas	Up to 20%
Floor	30 - 50%
Desk surface	35 - 50%

(IES Handbook - Fifth Edition, Illuminating Engineering Society, 1972, Section 11-13)

B. ILLUMINATION RECOMMENDATION STANDARDS: (Form 103)

Levels of Illumination Recommended (1)

Type of Area/Task	Footcandles on Task*
Tasks	
Reading printed material	30+
Reading pencil writing	70+
Spirit duplicated material	
Good	30+
Poor	100+
Drafting, benchwork	100a
Lip reading, chalkboards, sewing	150a
Classrooms	
Art rooms	70
Drafting rooms	100a+
Home economics rooms	
Cooking or Ironing	50
Sink activities	70
Note-taking areas	70+
Laboratories	100
Lecture rooms	
Audience area	70+
Demonstration area	150a
Music rooms	
Simple scores	30+
Advanced scores	70q+
Shops	100a
Sight-saving rooms	150a+
Study halls or Typing	70+

(1) Measured by hand held photometer.

Corridors and stairways.	20
Dormitories, General	10
Reading books, magazines, newspapers.	30+
Study desk.	70+

Notes

a Obtained with a combination of general lighting plus specialized lighting. Care should be taken to keep within the recommended luminance ratios. These seeing tasks generally involve the discrimination of fine detail for long periods of time and under conditions of poor contrast. The design and installation of the combination system must not only provide a sufficient amount of light, but also the proper direction of light, diffusion, color, and eye protection. As far as possible it should eliminate direct and reflected glare as well as objectionable shadows.

q . Localized general lighting.

* Minimum on the task at any time for young adults with normal and better than 20/30 corrected vision.

+ Equivalent sphere illumination.

(IES Handbook - Fifth Edition, Illuminating Engineering Society, 1972, Section 9-80)

C. FIRE PROTECTION FACILITIES: (Form 104)

Fire protection considerations and facilities are defined by the National Fire Protection Association according to the type of building and its usage. Mandatory requirements therefore vary widely according to the type of building and local code interpretations. However, the following requirements are considered generally applicable to public institutional facilities within the scope of the evaluation criteria on Form 106.

1. Fire Alarm Systems - Systems should be provided with separate independent circuitry and properly placed alarm or call boxes at or near the principal entry of a building and on each floor of the building.

2. Fire Escape Systems - All buildings should have at least two means of egress or exits for each floor of a building. Such means should include marked and lighted building or floor exits located not more than 100 feet from any classroom or other closed area, and may include outside fire escape systems or internal stairways. If outside escape systems are used, the nearest windows should present no obstruction, bars or hazards for effective use. Internal stairways should be of adequate size and lead directly to the outside entries of the buildings. Outside entries should be equipped with panic door-opening hardware to open outward.

3. Fire Extinguishers - Proper types of fire extinguishers should be provided on each building floor so that not more than 100 feet of travel is necessary to secure the use of an extinguisher. In laboratories and shops, extinguishers should be within 50 feet.

4. Other Systems - Sprinkler systems including hose and standpipe systems may be provided as required by building usage and design. Generally buildings of two stories or more or which exceed 50 feet in height should be provided with standpipe and hose facilities on each floor, either 1½" or 2½" hose systems.

D. PLUMBING-TOILET FACILITIES-MINIMUMS: (Form 103)

	Office Areas (1)	Schools	
		Male	Female
Waterclosets (4)	1/15 2/35 3/55 5/100 6/150	1/60	1/35
Lavatories	1/15 2/35 3/60 4/70 5/125 (3)	1/60	1/60

(1) Based on 50-50% male to female
(2) 1 per 40 over 150
(3) 1 per 45 over 125
(4) Urinals may be substituted for up to 1/3 the male requirements

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